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FOREST STATISTICS FOR SNOHOMISH CO., WASHINGTON

FOREST SURVEY REPORT NO. 128

PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
R. W. COWLIN, DIRECTOR
U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
PORTLAND, OREGON MAY 1957

PREPARED BY THE DIVISION OF FOREST ECONOMICS RESEARCH

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Field and Office Work in Snohomish County, Washington[1/]

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FOREST STATISTICS

for

SNOHOMISH COUNTY, WASHINGTON

Forest Survey Report No. 128

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and

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Pacific Northwest Forest and Range Experiment Station
U. S. Department of Agriculture Forest Service

R. W. Cowlin, Director
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FOREWORD

This publication summarizes results of a reinventory of the forests of Snohomish County, Washington, conducted in 1955. This reinventory is a part of the maintenance phase of the Forest Survey, a nationwide project of the Forest Service authorized by the McSweeney-McNary Forest Research Act of 1928, amended June 25, 1949. The purpose of the Forest Survey is to periodically inventory the extent and condition of forest lands and the timber and other products on them, to ascertain rates of forest growth and depletion, to estimate present consumption of timber products and to analyze and make available survey information needed in the formulation of forest policies and programs.

The Forest Survey is conducted in the various forest regions of the Nation by the regional forest experiment stations of the Forest Service. In the Pacific Northwest region of Oregon and Washington it is an activity of the Pacific Northwest Forest and Range Experiment Station at Portland, Oregon.

Under the initial phase of the Forest Survey, the forests of Snohomish County were inventoried in 1932. A statistical report, "Forest Statistics for Snohomish County, Washington" and a detailed forest type map on a scale of 1 inch to the mile were released a short time later. In 1938 the first reinventory of the county's forests was made and a revised statistical report and forest type map prepared.

Following the second reinventory in 1955 the forest type map has been revised again and is available on a scale of either 1 or 2 inches to the mile. 1/

1/ A print of the forest type map is available at cost of blueprinting. For information write Director, Pacific Northwest Forest and Range Experiment Station, P. O. Box 4059, Portland 8, Oregon.

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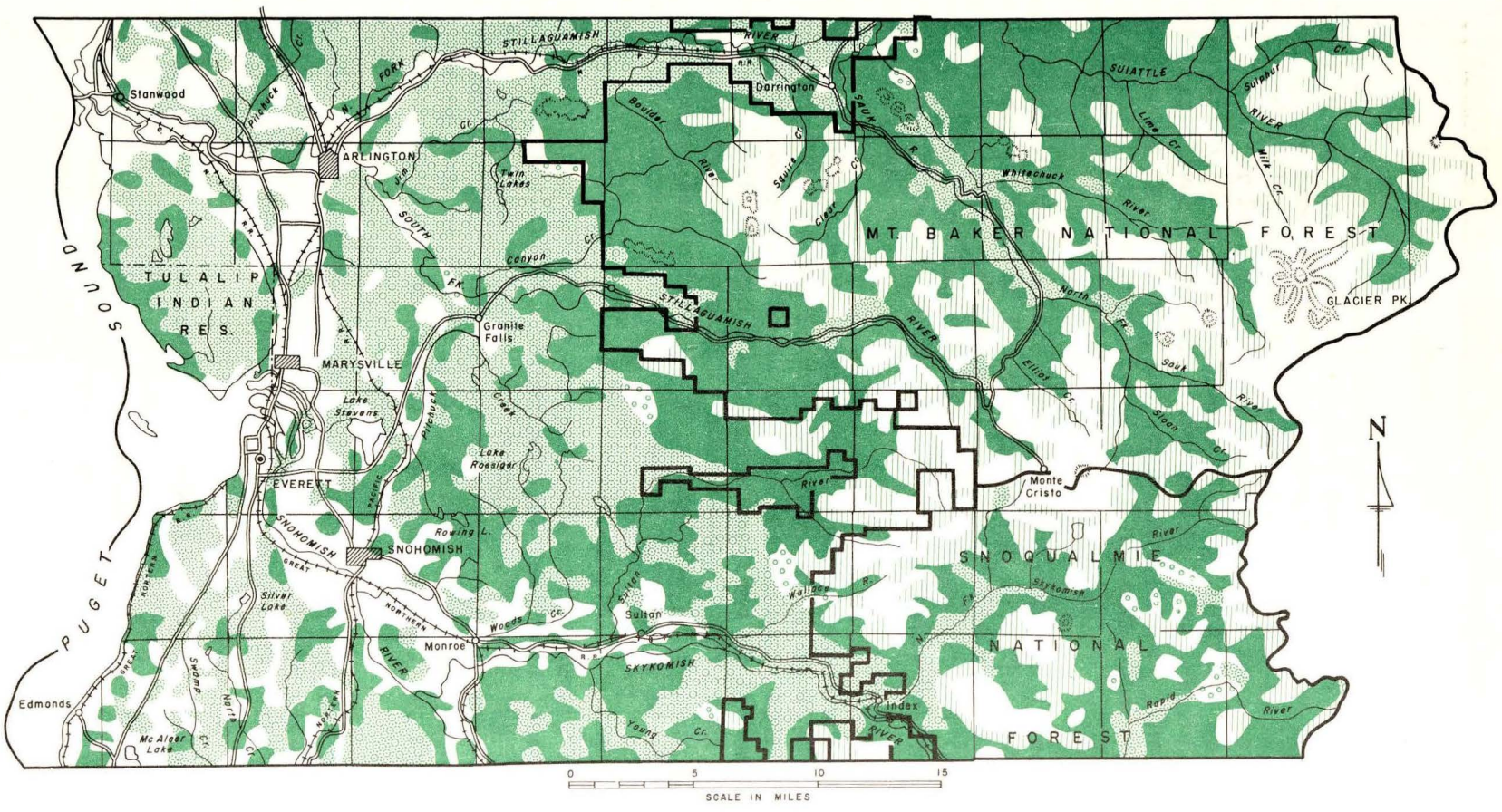
FIGURE 1

FOREST STAND-SIZE AND CONDITION CLASSES

SNOHOMISH COUNTY, WASHINGTON

1955



LEGEND

- Sawtimber stands
- Young-growth stands
- Nonstocked burns & cutover
- Noncommercial area
- Nonforest land

SIGNIFICANT FINDINGS IN THE FOREST INVENTORY

GENERAL

Snohomish County, in northern Washington, extends from the shore of Puget Sound to the crest of the Cascade Range 70 miles eastward. Its elevation climbs from the level Stanwood tideflats and deltas of the Snohomish and Stillaguamish Rivers at sea level to the 10,436-foot summit of Glacier Peak on the Cascade crest. Between these extremes lies a varied topography composed of river bottoms, gently rolling foothills, level benchlands, narrow deeply cut canyons, and numerous mountainous spurs of varying height and extent. The best agricultural lands in the county lie in the Skykomish, Snohomish, and Stillaguamish River valleys.

The entire county drains into Puget Sound by way of three rivers. The southern portion of the county drains into the Snohomish River, the central portion into the Stillaguamish River, and the northern portion into the Skagit River. Near the mountains the streams are rapid with numerous cascades and waterfalls entrenched in deep, steep canyons.

The climate, influenced by elevation, varies considerably throughout the county. At the lower elevations along Puget Sound the temperature is moderate with an average rainfall of about 35 inches per year. In the rugged mountainous sections of the eastern portion of the county, the climate is more severe, with greater extremes in temperature and rainfall. This area has an average annual precipitation considerably over 100 inches, a large part of which falls as snow.

The more heavily populated portions of Snohomish County have good transportation facilities. Arterials, as well as all-weather feeder roads of good quality, make all occupied parts of the county accessible by automobile. Railroad service is available to most sections by one or more of the following three railroads: Great Northern; Northern Pacific; and the Chicago, Milwaukee, St. Paul, and Pacific Railroads.

Most of the wealth of the county is based on its forest and agricultural resources. In 1955, manufacturing payrolls amounted to $46.5 million; of this total $38.5 million came from forest products industries.

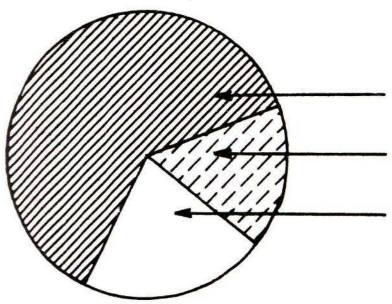
The population in 1950 numbered 111,580 inhabitants. This compares with the 1930 and 1940 estimates of 78,861 and 88,754 respectively. The population is about 42 percent urban and 58 percent rural farm and nonfarm. Only one city in the county, Everett, has a population exceeding 30,000.

LAND CLASSIFICATION

Snohomish County is predominantly a forest county. The nonforest area occurs chiefly as agricultural lands in the river valleys, townsites, and the area above timberline in the Cascade Range.

About 10 percent of the county is agricultural land which accounts for 42 percent of the total nonforest area. According to the 1950 Census of Agriculture, production of livestock and livestock products are the principal forms of agriculture; in 1950 they accounted for 79 percent of the value of all farm products sold.

The remaining 58 percent of the nonforest land is mainly occupied by townsites and the barren areas above timberline in the mountainous areas.



CLASS	THOUSAND ACRES	PERCENT
COMMERCIAL FOREST	819	62
NONCOMMERCIAL FOREST	215	16
NONFOREST	299	22
TOTAL	1,333	100

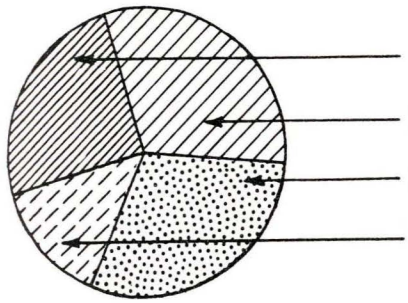
Noncommercial forest land consists of unproductive areas and productive but reserved forest land. The unproductive areas total 146 thousand acres and are incapable of yielding usable wood products because of adverse site conditions, or are so physically inaccessible as to be unavailable economically in the foreseeable future. Most of the 69 thousand acres of productive but reserved forest land have been set aside for recreational purposes. Included in this category are the Glacier Peak, the Alpine Lakes, and the Monte Cristo Peak Limited Areas.

Also set aside are the Lake 22 and Long Creek Natural Areas. These areas are to be permanently preserved in an unmodified condition for purposes of scientific study, research, and education.

COMMERCIAL FOREST LAND AREA

Major Types

Snohomish County's forests are typical of those in the Douglas-fir subregion of western Oregon and western Washington. The three major forest types are Douglas-fir, hemlock-Sitka spruce, and hardwoods.

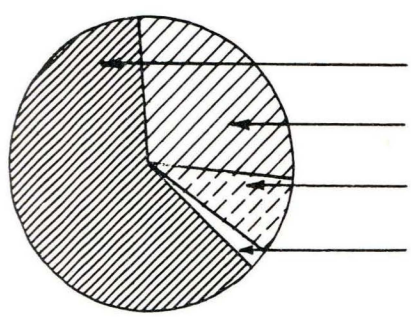


MAJOR TYPE	THOUSAND ACRES	PERCENT
DOUGLAS-FIR	206	25
HEMLOCK-SITKA SPRUCE	252	31
HARDWOODS	242	30
OTHER TYPES	119	14
TOTAL	819	100

In general, Douglas-fir stands occur throughout the county at lower elevations. With increasing elevation they are replaced by stands of hemlock and true firs. The hardwood stands also occur at lower elevations, many having become established after logging of the original softwood stand. On a large portion of this hardwood type acreage, one or more softwood species occurs as a component. Generally, red alder is the predominant hardwood species throughout the county. Other types are mainly fir-spruce with limited areas of western white pine and lodgepole pine.

Stand-Size Class

After almost a century of timber harvesting, sawtimber stands now occur on 481 thousand acres, or 59 percent of the commercial forest area. Stands on 300 thousand acres are classified as large sawtimber, i.e., with the volume predominantly in trees more than 21 inches d.b.h. The remaining 181 thousand acres are in small sawtimber stands.



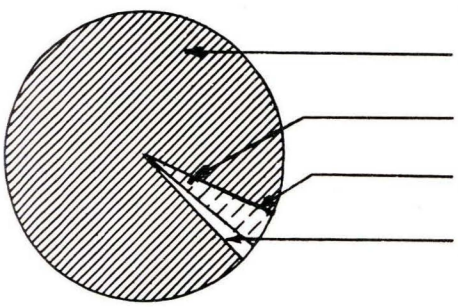
STAND SIZE	THOUSAND ACRES	PERCENT
SAWTIMBER	481	59
POLETIMBER	249	30
SEEDLING AND SAPLING	77	9
NONSTOCKED	12	2
TOTAL	819	100

Cutting of timber in the past has been concentrated on private lands because of higher quality of timber, more desirable species, and greater accessibility. Private lands contain 156 thousand acres of sawtimber stands: about one-half is in softwood stands, 5,000 or more board-feet per acre, and one-half in hardwood stands, 1,500 or more board-feet per acre (International rule). Private lands also contain

174 thousand acres of poletimber; 75 thousand acres in softwood types; and 99 thousand acres in hardwood types. Only 47 thousand acres are in smaller-size classes and nonstocked areas. National forest timber, which in general is at higher elevations, includes 262 thousand acres of sawtimber stands, and 42 thousand acres in smaller trees and in nonstocked areas. Ninety-eight percent of the county's total acreage of poletimber and seedling and sapling stands is restocked logged-over land. The remaining 2 percent is mostly restocked burns. The nonstocked area is 82 percent recent clear-cuts and 18 percent is old clear-cuts and burned-over areas.

Stocking of Young-Growth Stands

Most of the young-growth stands are adequately stocked. Ninety-eight percent of the area of these stands, which include young-growth sawtimber, poletimber, and seedling and sapling stands is medium and well-stocked. Only 2 percent is in poorly stocked stands or non-stocked areas.



STOCKING CLASS	THOUSAND ACRES	PERCENT
WELL	525	94
MEDIUM	21	4
POOR	1	1/
NONSTOCKED	12	2
TOTAL	559	100

1/ Less than 0.5 percent.

About 99 percent of the young-growth sawtimber stands are well-stocked. In poletimber stands 98 percent are well-stocked and 2 percent medium-stocked. Seventy-nine percent of the seedling and sapling areas are well-stocked and 20 percent medium-stocked.

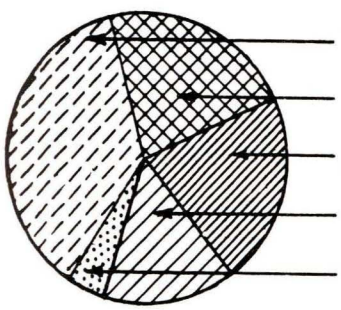
In classifying young-growth stands for stocking, all commercial tree species of all sizes are considered. Thus, a young-growth sawtimber stand may be classed as well-stocked on the basis of sawtimber-size trees, poletimber, seedlings and saplings, or any combination of these sizes.

COMMERCIAL FOREST LAND TIMBER VOLUMES

The net volume of live sawtimber trees (11.0 inches d.b.h. and larger) on commercial forest land is estimated to be 20,572 million board-feet, log scale, Scribner rule, or 22,241 million board-feet, log scale, International ¼-inch rule. Of the total Scribner volume, 19,993 million board-feet or 97 percent is in sawtimber stands; the remaining 579 million board-feet is in scattered sawtimber trees in the overstory of poletimber and seedling and sapling stands.

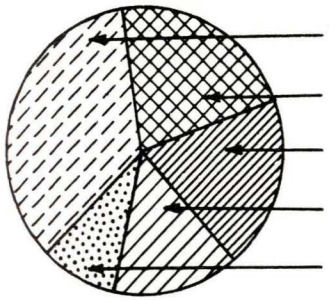
Species

The live softwood volume, Scribner rule, totals 19,556 million board-feet. Hardwoods make up 1,016 million or about 5 percent of the total sawtimber volume; this percentage may be surprising in view of the relatively large acreage of hardwoods and the fact that they occur as associated species in many coniferous stands. Western hemlock accounts for 37 percent. Pacific silver fir makes up 22 percent, and Douglas-fir 21 percent of the total sawtimber volume. The remaining softwood volume is distributed in descending magnitude among western redcedar, mountain hemlock, Alaska-cedar, Sitka spruce, western white pine, lodgepole pine, and white fir. The principal hardwoods are red alder, black cottonwood and bigleaf maple.



SPECIES	SAWTIMBER MILLION BD.-FT. (Scribner)	PERCENT
WESTERN HEMLOCK	7,711	37
PACIFIC SILVER FIR	4,488	22
DOUGLAS-FIR	4,266	21
OTHER SOFTWOODS	3,091	15
HARDWOODS	1,016	5
TOTAL	20,572	100

Seventy-seven percent of the sawtimber volume is in trees 21 inches or over in diameter. Of this volume, about one-third is in trees 21.0 to 30.9 inches d.b.h., one-third in trees 31.0 to 40.9 inches, and one-third in trees over 41.0 inches d.b.h.



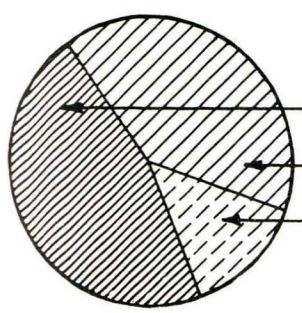
SPECIES	GROWING STOCK MILLION CU. FT.	PERCENT
WESTERN HEMLOCK	1,480	35
PACIFIC SILVER FIR	927	22
DOUGLAS-FIR	809	19
OTHER SOFTWOODS	622	15
HARDWOODS	377	9
TOTAL	4,215	100

Growing-stock volume includes poletimber-size trees 5.0 to 10.9 inches in diameter and sawtimber-size trees 11.0 inches and larger, all to a minimum 4-inch top inside bark. Of the total growing stock, 10 percent is in poletimber trees; the remainder, in sawtimber trees.

FOREST OWNERSHIP

About 46 percent of the commercial forest land in Snohomish County is in private ownership. The size of individual ownership varies from a few acres on farm woodlots to large industrial holdings. Most of Snohomish County's private land has followed a more or less typical pattern of ownership change. Following original cutting, few of the original large owners retained their cutover lands, so practically all of this acreage passed into other hands. Some areas of the deforested land reverted to the county through tax foreclosure. The county in turn disposed of it either to private owners or to the State as Forest Board land. In the past 10 to 15 years the trend has been toward the purchasing of forest land by the larger companies. Much of this area is in tree farms.

Of the total private ownership, 28 percent is in 10-99-acre size holdings which represent 90 percent of the private owners. Twenty-one percent is in 100-499-acre size holdings representing 9 percent of the owners. Fifty-one percent is in areas larger than 500 acres and represents one percent of the total number of owners.

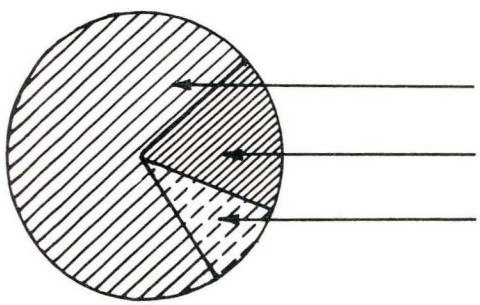


OWNERSHIP CLASS	THOUSAND ACRES	PERCENT
PRIVATE	378	46
FEDERAL	325	40
OTHER PUBLIC	116	14
TOTAL	819	100

Approximately 40 percent of the commercial forest land is in Federal ownership. Ninety-four percent of this is in national forests, with one-fourth in the Snoqualmie National Forest and three-fourths in the Mt. Baker National Forest. The remaining 6 percent, 20 thousand acres, is owned or managed by the Bureau of Indian Affairs, Department of Defense, or the Bureau of Land Management. Other public land is in State ownership, with the exception of 3,900 acres of municipal ownership and 1,520 acres county-owned.

Sawtimber Volume

Private and State-owned forest lands are more accessible, and have been logged more extensively than federally owned national forest lands. Consequently, privately owned lands contain only 17 percent of the sawtimber volume but have 33 percent of the sawtimber area. Federal lands have 73 percent of the sawtimber volume on 56 percent of the sawtimber area. Other public lands have 10 percent of the sawtimber volume on 11 percent of the sawtimber area.



OWNERSHIP CLASS	MILLION BD.-FT.	PERCENT
FEDERAL	14,975	73
PRIVATE	3,589	17
OTHER PUBLIC	2,008	10
TOTAL	20,572	100

FOREST UTILIZATION

The live timber harvest in Snohomish County in 1955 was 152 million board-feet, Scribner scale. Within the last 10 years, log output has averaged 165 million board-feet and ranged from 134 million in 1948 to 204 million in 1952.

The annual harvest of logs from national forest timber is becoming more important to the local timber economy as it represents an increasing portion of the total cut in the county. In 1949, 27 percent of the total annual cut came from the Snoqualmie and Mt. Baker National Forests. This increased to almost 41 percent in 1955.

Clear-cutting, high-lead yarding, and broadcast burning of slash, and tree-planting where necessary, characteristic of logging operations in the Douglas-fir subregion, are practiced in Snohomish County.

Because of its strategic location on Puget Sound, navigable by all classes of shipping, the county has had a large installed sawmill capacity for a long time. Within the last 10 years the average sawmill production for the county has been about 460 million board-feet per year which makes Snohomish County the second leading lumber producer in the State. In addition, in 1955 the three pulp mills in the county had an installed capacity of 1,355 tons per day. This high production has been maintained in Snohomish County only through the importation of logs.

Table 1.--Land area by major classes of land, 1955

Class of land	Area
	Acres
Forest:	
Commercial	818,760
Noncommercial:	
Productive-reserved	68,750
Unproductive	145,940
Total	1,033,450
Nonforest	299,650
All classes	1,333,100

Table 2.--Area of commercial forest land by ownership and stand-size classes, 1955

Ownership class	Total	Saw-timber stands	Pole-timber stands	Seedling and sapling stands	Nonstocked areas
			Acres		
Private	377,490	156,770	173,930	42,760	4,030
State	111,280	51,990	42,090	15,460	1,740
County	1,520	410	890	220	---
Municipal	3,900	1,660	1,700	540	---
Federally owned or managed:					
Indian	15,900	4,480	9,980	1,420	20
Bur. of Land Mgt.	870	270	430	170	---
National Forest	304,310	264,740	19,430	14,580	5,560
Other 1/	3,490	740	540	1,810	400
Total Federal	324,570	270,230	30,380	17,980	5,980
All ownerships	818,760	481,060	248,990	76,960	11,750

1/ U. S. Dept. of Defense.

Table 3.--Area of commercial forest land by major forest type, and stand-size class, 1955

Forest type	Total	Sawtimber stands		Pole-timber stands	Seedling and sapling stands	Non-stocked areas
		Large[1/]	Small[2/]			
		Acres				
Douglas-fir	205,770	55,630	60,160	76,460	13,520	--
Hemlock-Sitka spruce	252,320	151,220	19,710	35,610	45,780	--
Western white pine	160	--	50	110	--	--
Lodgepole pine	430	--	--	400	30	--
Fir-spruce	106,120	92,480	10,650	1,390	1,600	--
Hardwoods	242,210	650	90,510	135,020	16,030	--
Nonstocked areas	11,750	--	--	--	--	11,750
Total	818,760	299,980	181,080	248,990	76,960	11,750

1/ 21 inches d.b.h. and larger.

2/ 11 to 21 inches d.b.h.

Table 4.--Land area by cover type, ownership class, and land-use class, 1955

Cover type	Total unreserved and reserved	Unreserved									Reserved			
		Total	Private	State	County	Municipal	Federally owned or managed				Total	State	County	Federal National forest
							Indian	Bureau of Land Mgt.	National forest	Other[1]				
PRODUCTIVE FOREST LAND														
		Commercial									Noncommercial Productive-reserved			
	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
Douglas-fir, large old-growth sawtimber (yellow fir)	10,090	9,720	740	750	--	--	20	--	8,210	--	370	--	--	370
Douglas-fir, small old-growth and large young-growth sawtimber (red fir)	40,430	40,010	3,850	2,280	30	80	--	90	33,680	--	420	--	--	420
Douglas-fir, small young-growth sawtimber (red fir)	60,270	60,020	42,190	8,940	210	1,100	940	50	6,590	--	250	10	30	210
Douglas-fir, poletimber	76,370	76,370	53,080	13,000	140	1,280	1,810	40	6,900	120	--	--	--	--
Douglas-fir, seedlings and saplings	13,540	13,500	7,220	3,740	50	30	320	--	2,040	100	40	--	--	40
Western hemlock, large sawtimber	151,530	139,410	19,760	14,900	10	--	--	--	104,160	580	12,120	--	--	12,120
Western hemlock, small sawtimber	22,220	19,220	8,630	5,120	20	120	--	10	5,170	150	3,000	--	--	3,000
Western hemlock, poletimber	34,760	34,760	20,320	11,620	50	300	--	--	2,390	80	--	--	--	--
Western hemlock, seedlings and saplings	45,860	45,750	22,600	10,590	20	450	--	150	10,230	1,710	110	--	--	110
Sitka spruce, small sawtimber	220	220	220	--	--	--	--	--	--	--	--	--	--	--
Sitka spruce, poletimber	660	660	660	--	--	--	--	--	--	--	--	--	--	--
Western redcedar, large sawtimber	18,460	17,710	1,020	2,130	--	--	20	--	14,540	--	750	--	--	750
Western redcedar, small sawtimber	410	410	90	--	--	--	210	--	110	--	--	--	--	--
Western redcedar, poletimber	280	280	280	--	--	--	--	--	--	--	--	--	--	--
Western redcedar, seedlings and saplings	50	50	50	--	--	--	--	--	--	--	--	--	--	--
White pine, small sawtimber	50	50	--	--	--	--	50	--	--	--	--	--	--	--
White pine, poletimber	110	110	110	--	--	--	--	--	--	--	--	--	--	--
Lodgepole pine, poletimber	400	400	--	--	--	--	50	--	350	--	--	--	--	--
Lodgepole pine, seedlings and saplings	30	30	30	--	--	--	--	--	--	--	--	--	--	--
True fir-mountain hemlock, large sawtimber	133,220	92,480	2,960	7,220	--	--	--	--	82,300	--	40,740	--	--	40,740
True fir-mountain hemlock, small sawtimber	17,580	10,650	1,260	1,690	--	--	--	--	7,700	--	6,930	--	--	6,930
True fir-mountain hemlock, poletimber	2,680	1,390	210	70	--	--	--	--	1,110	--	1,290	--	--	1,290
True fir-mountain hemlock, seedlings and saplings	3,260	1,600	340	--	--	--	--	--	1,260	--	1,660	--	--	1,660
Hardwood, large sawtimber	650	650	480	--	--	--	170	--	--	--	--	--	--	--
Hardwood, small sawtimber	90,610	90,510	75,570	8,960	140	360	3,070	120	2,280	10	100	--	30	70
Hardwood, poletimber	135,100	135,020	99,270	17,400	700	120	8,120	390	8,680	340	80	20	60	--
Hardwood, seedlings and saplings	16,030	16,030	12,520	1,130	150	60	1,100	20	1,050	--	--	--	--	--
Recent clearcut area, nonstocked	9,660	9,660	3,930	1,690	--	--	20	--	3,620	400	--	--	--	--
Old clearcut area, nonstocked	30	30	30	--	--	--	--	--	--	--	--	--	--	--
Area deforested by fire, nonstocked	2,950	2,060	70	50	--	--	--	--	1,940	--	890	--	--	890
Total	887,510	818,760	377,490	111,280	1,520	3,900	15,900	870	304,310	3,490	68,750	30	120	68,600
NONCOMMERCIAL UNPRODUCTIVE FOREST LAND														
Noncommercial rocky	74,330	60,860	1,930	7,620	--	--	--	--	51,240	70	13,470	--	--	13,470
Subalpine	71,610	39,550	820	6,240	--	--	--	20	32,470	--	32,060	--	--	32,060
Total	145,940	100,410	2,750	13,860	--	--	--	20	83,710	70	45,530	--	--	45,530
NONFOREST LAND														
Agriculture	126,330	126,330	123,900	1,620	130	80	590	--	10	--	--	--	--	--
Grass and brush	47,000	35,810	2,460	3,630	10	60	130	--	29,520	--	11,190	--	--	11,190
Open--nonvegetative	126,320	76,230	28,000	5,690	1,070	1,060	740	50	39,180	440	50,090	--	--	50,090
Total	299,650	238,370	154,360	10,940	1,210	1,200	1,460	50	68,710	440	61,280	--	--	61,280
ALL LAND														
Forest land:														
Commercial	818,760	818,760	377,490	111,280	1,520	3,900	15,900	870	304,310	3,490	--	--	--	--
Noncommercial (productive-reserved and unproductive)	214,690	100,410	2,750	13,860	--	--	--	20	83,710	70	114,280	30	120	114,130
Total forest land	1,033,450	919,170	380,240	125,140	1,520	3,900	15,900	890	388,020	3,560	114,280	30	120	114,130
Nonforest land	299,650	238,370	154,360	10,940	1,210	1,200	1,460	50	68,710	440	61,280	--	--	61,280
Total all land	1,333,100	1,157,540	534,600	136,080	2,730	5,100	17,360	940	456,730	4,000	175,560	30	120	175,410

1/ U. S. Army (170 acres); U. S. Navy (3,830 acres).

Table 5.--Area of commercial forest land by forest-condition and ownership class, 1955

Forest-condition class	Total	Private	State	County	Municipal	Federally owned or managed			
						Indian	Bureau of Land Mgt.	National forest	Other 1/
	Acres								
Softwoods, large sawtimber									
Uncut	293,620	26,380	27,070	40	---	40	80	239,620	390
Residual	5,710	1,950	210	---	80	---	10	3,270	190
Total	299,330	28,330	27,280	40	80	40	90	242,890	580
Softwoods, small sawtimber									
Uncut	79,640	43,500	14,930	210	1,190	160	60	19,500	90
Residual	10,930	8,890	820	20	30	1,040	---	70	60
Total	90,570	52,390	15,750	230	1,220	1,200	60	19,570	150
Softwoods, poletimber									
On cutovers	109,280	74,100	24,030	180	1,580	1,810	40	7,340	200
On other	4,690	560	660	10	---	50	---	3,410	---
Total	113,970	74,660	24,690	190	1,580	1,860	40	10,750	200
Softwoods, seedlings and saplings									
On cutovers	58,120	29,470	13,950	70	480	320	150	12,130	1,550
On other	2,810	770	380	---	---	---	---	1,400	260
Total	60,930	30,240	14,330	70	480	320	150	13,530	1,810
Hardwoods	242,210	187,840	27,490	990	540	12,460	530	12,010	350
Nonstocked	11,750	4,030	1,740	---	---	20	---	5,560	400
Total	818,760	377,490	111,280	1,520	3,900	15,900	870	304,310	3,490

1/ U. S. Army (120 acres); U. S. Navy (3,370 acres).

Table 6.--Area of young-growth timber stands on commercial forest land, by stocking class, species group, and stand-size class, 1955

Stocking class and species group	Total	Sawtimber		Pole-timber	Seedlings and saplings	Non-stocked area
		Large 1/ young growth	Small young growth			
	Acres					
Well stocked:						
Softwoods	287,600	39,940	89,800	110,340	47,520	—
Hardwoods	237,660	—	90,400	133,900	13,360	—
Total	525,260	39,940	180,200	244,240	60,880	—
Medium stocked:						
Softwoods	16,900	70	700	3,290	12,840	—
Hardwoods	3,670	—	110	1,120	2,440	—
Total	20,570	70	810	4,410	15,280	—
Poorly stocked:						
Softwoods	980	—	70	340	570	—
Hardwoods	230	—	—	—	230	—
Total	1,210	—	70	340	800	—
Nonstocked	11,750	—	—	—	—	11,750
All classes:						
Softwoods	305,480	40,010	90,570	113,970	60,930	—
Hardwoods	241,560	—	90,510	135,020	16,030	—
Nonstocked	11,750	—	—	—	—	11,750
Total	558,790	40,010	181,080	248,990	76,960	11,750

1/ Includes only the stands classified and mapped as Douglas-fir large young-growth sawtimber type.

Table 7.--Net volume of live sawtimber and growing stock on commercial forest land, by ownership class, 1955

Ownership class	Live sawtimber		Growing stock
	Million board-feet, log scale, Scribner rule	Million board feet, International ¼-inch rule	Million cubic feet
Private	3,589	3,955	964
State	1,973	2,152	417
County	9	10	3
Municipal	26	29	8
Federally owned or managed:			
Indian	86	96	31
Bur. of Land Mgt.	8	9	2
National Forest	14,844	15,950	2,783
Other 1/	37	40	7
Total Federal	14,975	16,095	2,823
All ownerships	20,572	22,241	4,215

1/ U. S. Army less than 500 M; U. S. Navy 37 MM.

Table 8.—Net volume of live sawtimber and growing stock on commercial forest land, by stand-size class, 1955

Stand-size class	Live sawtimber		Growing stock
	Million board-feet, log scale, Scribner rule	Million board-feet, International ¼-inch rule	Million cubic feet
Sawtimber stands	19,993	21,592	3,854
Poletimber stands	575	645	360
Seedling and sapling stands	4	4	1
Nonstocked areas	1/	1/	1/
Total	20,572	22,241	4,215

1/ Less than .5 million.

Table 9.—Net volume of live sawtimber and growing stock on commercial forest land, by species, 1955

Species	Live sawtimber		Growing stock
	Million board-feet, log scale, Scribner rule	Million board-feet, International ¼-inch rule	Million cubic feet
Softwoods:			
Douglas-fir	4,266	4,602	809
Western hemlock	7,711	8,328	1,480
Mountain hemlock	740	800	156
Sitka spruce	91	97	22
Western redcedar	2,032	2,154	386
Alaska-cedar	109	116	25
Western white pine	82	89	22
Lodgepole pine	19	22	7
Pacific silver fir	4,488	4,846	927
White fir	18	19	4
Total	19,556	21,073	3,838
Hardwoods:			
Red alder	671	771	288
Bigleaf maple	139	160	53
Black cottonwood	183	210	29
Western paper birch	23	27	7
Total	1,016	1,168	377
All species	20,572	22,241	4,215

Table 10.--Net volume of live sawtimber on commercial forest land, by diameter-class and species groups, 1955

Diameter class and log rule	Total	Douglas-fir	Western hemlock	Western redcedar	Pacific silver fir	Other softwoods	Hardwoods
	Million board feet						
11.0" to 20.9" d.b.h.							
Scribner rule	4,642	865	1,538	184	935	279	841
International ¼-inch rule	5,138	1,004	1,661	195	1,009	301	968
21.0" to 30.9" d.b.h.							
Scribner rule	5,893	1,137	2,378	290	1,600	319	169
International ¼-inch rule	6,370	1,227	2,568	307	1,729	345	194
31.0" to 40.9" d.b.h.							
Scribner rule	4,989	837	2,212	351	1,325	261	3
International ¼-inch rule	5,364	888	2,389	372	1,430	282	3
41.0" d.b.h. and larger							
Scribner rule	5,048	1,427	1,583	1,207	628	200	3
International ¼-inch rule	5,369	1,483	1,710	1,280	678	215	3
All diameter classes							
Scribner rule	20,572	4,266	7,711	2,032	4,488	1,059	1,016
International ¼-inch rule	22,241	4,602	8,328	2,154	4,846	1,143	1,168

Table 11.--Net volume of all timber on commercial forest land, by class of material and species group, 1955

Class of material	Total	Softwoods	Hardwoods
	Million cubic feet		
Growing stock:			
Sawtimber trees:			
Sawlog portion	3,514	3,313	201
Upper stem portion	264	249	15
Total	3,778	3,562	216
Poletimber trees	437	276	161
Total growing stock	4,215	3,838	377
Other material:			
Sound cull trees	31	2	29
Rotten cull trees	21	19	2
Salvable dead trees	70	70	1/
Total other material	122	91	31
All timber	4,337	3,929	408

1/ Less than .5 million

Table 12.--Average annual cut of live sawtimber and growing stock on commercial forest land, by species group for the period 1952-55

Species group	Live sawtimber						Growing stock		
	Timber products	Logging residues	Annual cut 1/	Timber products	Logging residues	Annual cut 1/	Timber products	Logging residues	Annual cut 1/
	Thousand board-feet log scale, Scribner rule			Thousand board-feet, International ¼-inch rule			Thousand cubic feet		
Softwoods	165,733	4,077	169,810	178,163	4,383	182,546	28,823	3,269	32,092
Hardwoods	1,224	30	1,254	1,408	35	1,443	245	28	273
Total	166,957	4,107	171,064	179,571	4,418	183,989	29,068	3,297	32,365

1/ Annual cut is the sum of timber products and logging residues.

FOREST SURVEY PROCEDURE

The procedures used in the second Forest Survey reinventory of the forests of Snohomish County were materially different from the procedures used in the initial inventory and first reinventory. This change in procedures accounts for some significant differences in both the forest-area and timber-volume statistics obtained. Therefore, a brief description of procedures used in each inventory is in order.

INITIAL INVENTORY

The initial inventory of the county's forests was conducted in 1932 by what is known as the "compilation method." In this method existing information on forest types, timber cruises, and other pertinent data were collected from private timber owners and various public agencies. These data were checked in the field for reliability and, in case of timber cruises, they were adjusted to the specifications and standards of Forest Survey. Forest-type and timber-volume data for areas not covered by existing information were obtained through intensive field reconnaissance. Timber-volume estimates for immature stands were determined from normal yield tables adjusted for site, age, and density of stand.

All land in the county was classified as either forest or non-forest. Forest land was further classified as commercial or noncommercial; the commercial forest land was still further classified by type, stand-size class and, in case of young-growth stands, by stocking and age classes. These types and classes were delineated on 1-inch-to-the-mile base maps of each township. These township type maps were then superimposed over ownership-status plats and dot-counted to obtain forest-type-area statistics by ownership class. Type delineations on the township maps were traced on a base map of the county to form a county forest type map.

FIRST REINVENTORY

The first reinventory, in 1938, included a complete revision of the forest type map of the county. For this revision records of cutting and other forms of drain, since the original inventory, were obtained from various sources and verified in the field by ground reconnaissance. Areas on which the type had changed due to cutting, restocking of cutover or burned-over land, and ingrowth of immature stands were remapped on the ground. The ownership status was brought up to date. On the basis of the new ownership data and the revised forest type map, area statistics by forest types were recomputed.

Timber-volume estimates for mature sawtimber stands were based on cruise data collected during the original survey, adjusted for cutting and other drain that had occurred during the interval between inventories. Volume estimates for immature stands were based on yield tables adjusted for site, age, and density of stand.

SECOND REINVENTORY

In the second reinventory, in 1955, the forest type map was completely revised. This revision was accomplished through interpretation, classification, and field mapping on aerial photos covering all of the land area. In the mapping on aerial photos, types whose classification was difficult were examined more closely in the field. Likewise, species composition of mixed stands was checked on the ground. The use of aerial photos in mapping resulted in type delineations of much greater accuracy and detail than were possible through the ground reconnaissance employed in the initial inventory and first reinventory. In the preparation of a revised type map, the delineations on the aerial photos were transferred to a 2-inch county base map through use of a reflecting projector. The new type map was superimposed over a current ownership map of complete county coverage and a dot count made of forest type areas by ownership class.

Volume estimates for live sawtimber, growing stock, and salvable dead material were calculated by applying average per-acre volumes to the appropriate forest type acreages. The average per-acre volumes for sawtimber stands and poletimber stands were obtained through a sampling procedure in which the stands were measured on randomly selected plots. In the random selection of samples each individual sawtimber or poletimber stand in the county had a chance of being selected. A sample consisted of a cluster of 3 one-fifth-acre circular plots spaced at regular 6-chain intervals. Intensity of the sampling was designed to produce a total estimate of volume in the county of a specified sampling accuracy set by Forest Survey.

Average per-acre volumes of sawtimber and poletimber trees in the overstory of seedling and sapling stands and on nonstocked areas were obtained through an aerial photo plot sampling procedure. One-acre photo plots were located by a modified systematic-random pattern. Estimates were made of average number of trees per acre of both sawtimber and poletimber size, average crown diameter, and total tree height. Gross volume of the average tree was obtained from photo volume tables and then adjusted for defect and breakage in order to obtain net volume.

ACCURACY OF 1955 REINVENTORY DATA

FOREST AREA

In the second reinventory of the county, in-place mapping of the forests and their classification by forest type, stand-size class, and condition class, were based on 100-percent coverage. Thus no error due to sampling was involved. Errors due to techniques or judgment in the field and in office computation of data were possible, but difficult to evaluate. Throughout all phases of the work, however, close supervision and frequent checks assured a high level of accuracy and uniformity of standards.

TIMBER VOLUME

The chances are 19 out of 20 that the total board-foot volume of live sawtimber, if measured by a 100-percent cruise, would be within plus or minus 4.9 percent of the estimated total of 20,572 million board-feet, log scale, Scribner rule. On the same basis, cubic-foot volume of growing stock from a 100-percent cruise would be within a range of plus or minus 4.3 percent of the estimated 4,215 million cubic feet. Volume estimates by species, stand-size class, and other subdivisions are subject to greater sampling errors.

DIFFERENCES IN RESULTS OF INVENTORIES

There are actual physical changes in forest area and volumes between inventories. However, direct comparison between inventories with respect to forest-type, forest-area, and timber-volume statistics may not be meaningful because of variations in inventory procedures and changes in standards of utilization.

FOREST AREA

It is apparent in table 13 that (1) there has been no appreciable change in the total forest area or the noncommercial unproductive area, (2) there has been an increase in the sawtimber and poletimber area, (3) there has been a decrease in seedling and sapling area and nonstocked area.

Seedling and sapling areas for all inventories include stands of trees up to 4.9 inches d.b.h., but those for 1932 and 1938 do not include stands on areas clear-cut in the prior 10 years. Such land was included in the nonstocked class. The 1955 reinventory included the area of seedling and sapling stands on recently clear-cut land if trees were established at the time of the inventory. No adjustment of the acreage figures in table 13 was attempted for these factors.

Table 13.—Comparison of forest area statistics; initial inventory and reinventories

Forest area	Inventory		
	1932	1938	1955
	Thousands of acres		
Sawtimber 1/	493	471	546
Poletimber 1/	87	84	250
Seedlings and saplings	122	171	79
Nonstocked	213	190	13
Noncommercial unproductive 2/	145	146	146
All forest area	1,060	1,062	1,034

1/ 1932-38 data adjusted to present standards.
2/ Based on 1955 standards.

Urban development within the county slightly reduced the total forest land between inventories. In recent years the acreage of forest land cleared for agriculture has been nearly offset by reclamation of marginal agricultural land by forest growth.

During the 1932 and 1938 inventories, much red alder was thought to be too transitory to justify classification as hardwood types, and the area was classified as nonstocked. During the interval between inventories, areas originally classified as nonstocked which actually had established red alder seedling and sapling stands, grew to poletimber or sawtimber size and were classified as such in the current inventory.

TIMBER VOLUME

The three estimates of sawtimber volume on commercial forest land are shown in table 14.

Table 14.—Comparison of timber volume statistics; initial inventory and reinventories

Species	Inventory		
	1932 1/	1938 1/	1955
	Million bd.-ft. log scale, Scribner		
Western hemlock	7,446	7,126	7,711
Pacific silver fir	3,847	3,811	4,488
Douglas-fir	5,002	4,205	4,266
Other species	3,803	3,480	4,107
All species	20,098	18,622	20,572

1/ Volume estimates adjusted to same d.b.h. and top diameter limits as were used in 1955.

The 1932 and 1938 volume estimates were based on adjusted private cruises and ocular estimates of old-growth timber and yield-table values for young timber. The methods used in making the independent estimate in 1955 are described on page 21.

Some differences in volume estimates between 1932, 1938, and 1955 are due to differences in survey techniques, procedures, and methods. The effects of these differences on volume estimates cannot be measured. The 1955 volume estimate has a calculated sampling error (page 22). However, no statistical evaluation of the accuracy of the 1932 or 1938 estimates can be made.

Another difference in volumes may have been the variation in standards of utilization between inventories. The standards for certain species such as red alder, Pacific silver fir, western hemlock, mountain hemlock, etc., were changed between surveys to recognize increased use of these species. In 1955, volume tables were used that gave a materially greater volume for a tree of a given size than did the tables used in 1932 and 1938 inventories. Other changes included lowering the minimum requirement of net sound volume in a sawtimber tree from 33-1/3 to 25 percent of gross volume.

One factor that increased the board-foot volume of sawtimber during the periods of inventory was forest growth. Both net growth in sawtimber trees and the ingrowth of poletimber trees into the sawtimber class contributed to this increase. The offsetting factors that tended to reduce the sawtimber inventory are drain due to timber cutting and natural depletion, such as forest insects, diseases, windthrow, and fire.

Because of the influence of so many variable factors the three inventory estimates are not comparable and do not necessarily reflect a trend or actual changes in the county's total volume of sawtimber.

DEFINITION OF TERMS USED

LAND AREA

Total Land Area

Includes dry land and unmeandered water surface.

Forest Land Area

Includes (a) land which is at least 10-percent stocked by trees of any size and capable of producing timber or other wood products, or of exerting an influence on the climate or on the water regime; and (b) land from which the trees described in (a) have been removed to less than 10-percent stocking and that has not been developed for other use. Minimum area of forest land recognized in reinventory of the county is 10 acres.

Nonforest Land Area

Land that does not qualify as forest land. Minimum area recognized in the reinventory of the county is 10 acres.

FOREST LAND CLASSES

Commercial Forest Land Area

Forest land that is producing, or is physically capable of producing, usable crops of wood, economically available now or prospectively, and that is not withdrawn from timber utilization.

Noncommercial Forest Land Area

Forest land (a) withdrawn from timber utilization through statute, ordinance, or administrative order but that otherwise qualifies as commercial forest land, and (b) incapable of yielding usable wood products (usually sawtimber) because of adverse site conditions, or so physically inaccessible as to be unavailable economically in the foreseeable future.

TYPES

Forest Land Types

Forest land is typed on the basis of predominant species as indicated by cubic volume for sawtimber and poletimber stands, and number of trees for seedling and sapling stands, or on the basis of forest condition such as nonstocked cutover or burned-over land.

Where none of the indicated species comprises 50 percent or more of a given stand, the stand is typed on the basis of plurality of cubic volume or number of trees. In classifying forest land by type, the minimum area recognized is 40 acres.

Commercial Forest Land

Major forest types. Local forest types are grouped into generalized types. The major forest types in Snohomish County are as follows:

Douglas-fir. Forests in which 50 percent or more of the stand is Douglas-fir. Western redcedar types adjacent to Douglas-fir type are also classed as Douglas-fir major type.

Hemlock-Sitka spruce. Forests in which 50 percent or more of the stand is western hemlock or Sitka spruce. Types adjacent to Douglas-fir type are also classed as hemlock-Sitka spruce major type.

Western white pine. Forests in which 50 percent or more of the stand is western white pine.

Lodgepole pine. Forests in which 50 percent or more of the stand is lodgepole pine.

Fir-spruce. Forests in which 50 percent or more of the stand is true fir or Engelmann spruce.

Hardwoods. Forests in which 50 percent or more of the stand is red alder, black cottonwood, or other western hardwoods, singly or in combination.

Noncommercial Forest Land

Productive-reserved. Forest land withdrawn from timber utilization through statute, ordinance, or administrative order, but which otherwise qualifies as commercial forest land.

Unproductive. Forest land incapable of yielding usable wood products (usually sawtimber) because of adverse site conditions, or so physically inaccessible as to be unavailable economically in the foreseeable future.

Nonforest Land Types

Agricultural. Cultivated land or stump pasture.

Grass and brush. Grass or brush on nonforest land.

Open-nonvegetative. Includes barrens, tideflats, towns, and unmeandered water.

TREE CLASSES

Sawtimber Tree

Tree of commercial species, 11 inches d.b.h. or larger, that contains at least one 16-foot coniferous sawlog or one 8-foot hardwood sawlog to a variable top diameter never less than 8 inches inside the bark. Also, 25 percent or more of the gross board-foot volume must be free from rot or defect.

Poletimber Tree

Softwood or hardwood tree 5.0 to 10.9 inches d.b.h. of commercial species in which 25 percent or more of the gross cubic-foot volume is free from rot and defect.

Seedling and Sapling Trees

Live trees of commercial species less than 5.0 inches d.b.h. Seedlings must be of good form and vigor.

Cull Tree

Live tree of sawtimber or poletimber size that is unmerchantable, now or prospectively, because of defect, rot, or species.

Sound cull tree. Live tree of sawtimber or poletimber size which contains 25 percent or more of sound volume but will not make at least one merchantable log, now or prospectively, because of roughness, poor form, or species.

Rotten cull tree. Live tree of sawtimber or poletimber size in which less than 25 percent of the total volume is sound.

Salvable Dead Tree

Standing dead or down tree which contains 25 percent or more of sound volume and at least one merchantable 16-foot coniferous or 8-foot hardwood log.

STAND-SIZE CLASSES

Sawtimber Stand

Stand of sawtimber trees having a minimum net volume per acre as follows: 5,000 board-feet, log scale, International ¼-inch rule, in any species except hardwoods; 1,500 board-feet in hardwoods.

Large sawtimber stand. Stand in which the majority of the volume is in trees more than 21.0" d.b.h.

Small sawtimber stand. Stand in which the majority of the volume is in trees from 11.0" to 20.9" d.b.h.

Uncut Sawtimber Stand

Sawtimber stand that has had not more than 10 percent of its volume removed by cutting.

Residual Sawtimber Stand

Sawtimber stand in which over 10 percent of the volume has been removed, and in which the residual volume amounts to 5,000 board-feet or more per acre for softwoods and 1,500 board-feet for hardwood stands.

Poletimber Stand

Stand failing to meet sawtimber-stand specifications but at least 10-percent stocked with poletimber and larger (5.0" d.b.h. and larger) trees and at least half the minimum stocking in poletimber trees.

Seedling and Sapling Stand

Stand not qualifying as either sawtimber or poletimber stand but having at least 10-percent stocking of trees of commercial species and with at least half the minimum stocking in seedling and sapling trees.

Stocking

Stocking is the extent to which growing space is effectively utilized by present or potential growing-stock trees of commercial species. "Degree of stocking" is synonymous with "percent of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands. Stocking may be measured in terms of number of trees, volume, basal area, cover canopy, or other criterion or combination of criteria.

Well-stocked stands. Stands that are 70 percent or more stocked with present or potential growing-stock trees.

Medium-stocked stands. Stands that are 40 to 69 percent stocked with present or potential growing-stock trees.

Poorly stocked stands. Stands that are 10 to 39 percent stocked with present or potential growing-stock trees.

Nonstocked areas. Areas that are 0 to 10 percent stocked with present or potential growing-stock trees.

TIMBER VOLUME

Live Sawtimber Volume

Net volume in board-feet of live sawtimber trees of commercial species.

Scribner rule. The common board-foot rule used in determining log-scale volume of sawtimber in the Pacific Northwest.

International $\frac{1}{4}$-inch rule. The standard board-foot rule adopted nationally by the Forest Service in the presentation of Forest Survey volume statistics.

Growing Stock

Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) inside bark.

All-Timber Volume

Net volume in cubic feet of live and salvable dead sawtimber trees and poletimber trees of commercial species, and cull trees of all species from stump to a minimum 4.0-inch top inside bark.

Tree Species

Tree species commonly found in Snohomish County include:

Softwoods:
- Douglas-fir (*Pseudotsuga menziesii*)
- Western hemlock (*Tsuga heterophylla*)
- Mountain hemlock (*Tsuga mertensiana*)
- Sitka spruce (*Picea sitchensis*)
- Western redcedar (*Thuja plicata*)
- Western white pine (*Pinus monticola*)
- Lodgepole pine (*Pinus contorta*)

Pacific silver fir (Abies amabilis)
Grand fir (Abies grandis)
Subalpine fir (Abies lasiocarpa)
Alaska-cedar (Chamaecyparis nootkatensis)

Hardwoods: Red alder (Alnus rubra)
Bigleaf maple (Acer macrophyllum)
Black cottonwood (Populus trichocarpa)
Western paper birch (Betula papyrifera var. commutata)

TIMBER CUT

Annual Cut of Live Sawtimber

The net board-foot volume of live sawtimber trees cut or killed by logging on commercial forest land during a specified year.

Timber products from live sawtimber. The volume of timber products cut from live sawtimber.

Logging residues from live sawtimber. The net board-foot volume of live sawtimber trees cut or killed by logging on commercial forest land and not converted to timber products.

Annual Cut of Growing Stock

The net cubic-foot volume of live sawtimber and poletimber trees cut or killed by logging on commercial forest land during a specified year.

Timber products from growing stock. The volume of timber products cut from growing stock.

Logging residues from growing stock. The net cubic-foot volume of growing stock cut or killed by logging on commercial forest land and not converted to timber products.